DOCUMENT RESUME

ED 419 249 CS 216 345

AUTHOR Henning, John
TITLE Meaning as Structure: How Interpretants Become Signs in Text.
PUB DATE 1998-04-16
NOTE 27p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Diego, CA, April 13-17, 1998).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Classification; *Cognitive Processes; English Instruction; Grade 11; High Schools; Interpretive Skills; Protocol Analysis; Reader Response; *Reading Comprehension; Semiotics; *Text Structure; *Thinking Skills
IDENTIFIERS Cognitive Research; *Text Building; *Text Processing (Reading)

ABSTRACT

A study aimed to discover a correspondence between the thinking processes and textual structures of six eleventh graders. In a predominantly White, middle class rural high school, six students were selected to think aloud as they read two essays written as part of two assignments for their advanced English classes. The six were selected based on the texts they composed and classified into three pairs representing high, middle, and low levels of text complexity. Analysis of the student protocols indicated that the students who composed the most complex texts also possessed the highest awareness of their thinking processes while reading. Contains 2 tables and 34 references. (NKA)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 419 249

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

John Henning
Kent State University
Paper Presented at the Annual Meeting of AERA
for the Semiotic SIG
April 16, 1998
J_Henning@dukes.stark.k12.oh.us

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
J. Henning
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

MEANING AS STRUCTURE: HOW INTERPRETANTS BECOME SIGNS IN TEXT

Overview and Purpose

This study was an attempt to discover a correspondence between the thinking processes and textual structures of six eleventh graders. Six students were selected to think aloud as they read two essays written as part of two assignments for their advanced English classes. The six were selected based on the texts they composed and classified into 3 pairs representing high, middle, and low levels of text complexity. An analysis of the student protocols indicated that the students who composed the most complex texts also possessed the highest awareness of their thinking processes while reading.

Theoretical Framework

Reader-Response Theory

To what degree the reader or the text determines meaning varies from reading theorists like Lois Rosenblatt (1978); who posited a three-way interaction between author, text, and reader to David Bleich (1978); who sees text interpretation as a completely subjective phenomenon. Other theorists have credited identity (Scholes,1989; Beach, 1993), gender (Gilligan 1978, 1982; Belenky et al,1986; Beach, 1993), reading stance (Rosenblatt, 1978), social class (Heath, 1982), and membership in an "interpretive community" (Fish cited in Beach, 1993) as factors in

CS216345

BEST COPY AVAILABLE

determining how readers interpret text. Although all of these theorists represent different positions, they are all agreed that reading involves much more than a one-to-one correspondence between the printed word and the reader.

Yet given all this potential diversity, English teachers still spend an inordinate amount of hours offering students advice on the best ways to achieve the thoughtful,insightful essays that those same teachers spend inordinate amounts of hours evaluating for their thoughtful insights. It would seem that all who participate in this process of instruction and evaluation hold a tacit agreement that the quality of thought in writing is observable.

A Semiotic Approach

It is my contention that a semiotic approach to cognition can provide important insights into the thought processes necessary for interpreting text. Accordingly, I will begin by first defining Peirce's conception of triadicity, especially emphasizing the role of the interpretant. Second, I will link these initial concepts with the Piagetan and Vygotskean descriptions of cognitive change and development as a way of strengthening the core description of cognitive growth developed in this study. And finally, I will attempt to show how all three of these perspectives can enrich current ideas about reading comprehension.

Before beginning a discussion of C.S. Peirce's triadic conception of thought, it might be wise to note that the following discussion is very brief, that Peirce defined triadicity from a wide variety of perspectives which encompassed a great many pages, and that there is room here for only a very limited accounting,

one that necessarily has an immediate application to the purpose at hand. Given that caveat, let us begin.

According to Peirce (1965), there are three fundamental categories of mind - firstness, secondness, and thirdness. In firstness, thought still exists in an undifferentiated whole; firstness is a feeling, a quality, an undivided state of mind before any sort of discrimination has been made. Secondness begins when the mind becomes conscious of difference, of the other, and is characterized by dyadic relationships like identity and difference, cause and effect, persistence and change, or (perhaps the most often referred to semiotic relationship) object and sign. But although there is difference in secondness, there is also linkage; "not only have we brought the cognitive forces into play by distinguishing, we have also united them into one" (Peirce, 1965, p. 169). It is, however, a union that exists before mediation, before reflection, before thought.

What unites dyads is difference; in thirdness, however, there is a true synthesis between firstness and secondness. Thirdness is the relationship between firstness and secondness, a synthesis of what has been distinguished in secondness:

> Since there is a manifold of impressions, we have a feeling of complication or confusion, which leads us to differentiate this impression from that, and then, having been differentiated, they require to be brought to unity . . . the reference to an interpretant arises upon the holding together of diverse impressions. (Peirce, 1991, p. 28)

The interpretant described in Peirce's quote can be thought of as the thought that holds object (firstness) and sign (secondness) together, a thought that interprets a previous thought, or from

yet another angle, an abstraction of what was immediate.

Critical to the theoretical foundation of this paper, is the recognition that the threefold semiotic relationship is a relative one, i.e. interpretants become signs. For instance, because an interpretant is a thought interpreting a previous thought, then a succeeding thought is necessary to interpret the first interpetant and so on, ad infinitum. Or as Peirce puts it, "The meaning of a representation can be nothing but a representation. . . . there is an infinite regression here" (p.171). The developmental theorists discussed in the following section have alternate ways of describing the same phenomenon.

Correspondences with Developmental Theories

I began by describing the triadic interplay of firstness, secondness, and thirdness as a process of differentiation and integration. That description has striking correspondences with accounts of developmental changes in cognition. For instance, equilibration, what Piaget referred to as "the fundamental factor in cognitive development" (1985, p. 15) can be described as an undifferentiated whole (firstness), disturbed by disequilibria (eg. errors or lacunae - secondness), which are then reintegrated by the process of assimilation and accommodation (thirdness). Vygotsky describes a similar process in his description of the interaction between thought and speech. According to Vygotsky, children's speech begins with undifferentiated thought (firstness) - or as he put it - "a dim, amorphous whole." It is through words that we are able to differentiate (secondness) this whole into meaningful parts:

Semantically, the child starts from the whole, from a

meaningful complex, and only later begins to master the separate semantic units, the meanings of words, and to divide his formerly undifferentiated thought into those units" (1986,p. 219).

Thought is then resynthesized through speech (thirdness).

A third developmental approach that assigns a primary role to differentiation and integration (1969, 1984, 1992) is Eleanor Gibson's theory of perceptual learning. Using James Gibson's ecological approach as a foundation (1966, 1977, 1979), Eleanor Gibson maintains that we can learn directly from from the environment. A quick survey of her theory is as follows: undifferentiated general responsiveness to stimulation (firstness), followed by differentiation of simple patterns and objects from background stimulation (secondness), and then the abstraction of distinctive features or invariant relations (thirdness).

In addition to this view of cognitive development as a process of differentiation and synthesis, each of these theorists also shares Peirce's conception of the "infinite regression" of one thought interpreting another, what Eco succinctly termed "unlimited semiosis" (1976). Within Piaget's concept of equilibration there is no endpoint to the process of constructing thoughts from thoughts, or in his words, equilibration "in no way constitutes a stopping point":

> Effectively, therefore, no system ever constitutes an absolute end point of equilibration; new goals are always established by whatever equilibrium has been achieved, stable or unstable. Each end point, even if it is more or less lasting, remains pregnant with possibilities for further

construction (1985, p.26).

Similarly, Vygotsky believed that "generalizations are built on generalizations" indefinitely. According to his law of equivalence of concepts "any concept can be formulated in terms of other concepts in a countless number of ways" (1986, p. 199). Even James Gibson's theory of direct perception incorporates the idea of an unending interpretation of the environment. As Gibson states below, the possibilities for generalizing about what we are perceive are limitless:

> A perceiver can keep noticing facts about the world she lives in to the end of her life without ever reaching a limit. There is no threshold for information comparable to a stimulus threshold. Information is not lost to the environment when gained by the individual; it is not conserved like energy (1979, p. 243).

To this point, two important processes of cognition have been compared from both a semiotic and developmental perspective: 1) differentiation and integration and 2) the limitless constructive process of cognition. Within Gibson's theory of direct perception, these processes are largely unconscious, but in both Vygotsky and Piaget's theories of development, they are facilitated by an increasing metacognitive awareness. For Piaget this was part of his description of the formal operations of thought, what he called an adolescent's ability to think about thinking. More formally stated, Piaget termed this process "reflective abstraction." Like equilibration, reflective abstraction also describes how thought builds upon thought:

> Reflective abstraction includes two indissociable activities. One is 'reflecting' or projecting onto a higher level

something borrowed from a lower level. . . The other is more or less conscious 'reflexion' in the sense of cognitive reconstruction or reorganization of what is transferred" (1985, p.29).

Vygotsky's research also pointed to the very same kind metacognitive development. From his perspective, increasing consciousness of the thought processes was a qualitative change that improved proficiency:

> In perceiving some of our acts in a generalizing fashion, we isolate them from our total mental activity and are thus enabled to focus on this process as such and to enter into a new relation to it. In this way becoming conscious of our operations and viewing each as a process of a certain *kind* - such as remembering or imagining - leads to their mastery (1986, p. 170 - 171).

It seems clear that both Piaget and Vygotsky recognized that self awareness facilitates the unending process of constructing thoughts from thoughts, what Peirce described as an "infinite regression" of representation interpreting representation, and what I have - so far in a limited way - tried to characterize as the process of interpretant becoming sign in an unending series of transformations.

To this point, I have attempted to establish the following connections between the semiotic and developmental theories described above:

1) All describe cognitive development is a process of discrimination followed by synthesis.
2) All describe a constructive process of generalizations built upon generalizations

3) All describe this process as unlimited.

4) Piaget and Vygotsky discuss the importance of self awareness and reflection as important to the more advanced stages of building generalizations.

Reading Research

I believe there is a strong link between the cognitive processes described above and the cognition that occurs during reading. Specifically, current models of reading (Graesser, Millis, and Zwann, 1997; Lorch and van der Brock, 1997) identify three levels of discourse representation - the surface code, the textbase, and the situation model - separated by levels of abstraction. The surface code, the least abstract level, preserves wording and syntax of text exactly. The textbase, a slight abstraction of the surface code, preserves meanings close to the surface code, but in a propositional form, rather than the exact text of surface code. Much farther away from the surface code than the text base is the situation model, which refers to the real world content of the text and is presumably constructed by inferences from the surface code and text base. Although the situation model exists on a relatively high plane of abstraction, researchers have found that if readers are to comprehend the text, the situation model must be consistent in terms of spatiality, causality, temporality, and intentionality, (Graesser, Millis, and Zwann, 1997).

By comparing this model of reading comprehension to the semiotic description of cognition discussed above, we find that both descriptions rely on a construction of previous thought. In reading theory, generalizations from the surface code become the

text base, which then becomes the situation model, which is then further processed by a check for coherence in terms of spatiality, temporality, etc. This would seem to suggest that a good bit of reading processes are metacognitive - thought operating on thought. If so then the expert reader would necessarily have to be highly proficient at constructing thinking from thinking. Further, if the logic of the previous sections applies to this model of reading, then the following inferences might have some merit for the study of reading comprehension:

1) A reader's ability to differentiate thought would also affect her ability to generalize or construct new thoughts from other thoughts.
2) The number of generalizations or inferences a reader could make from text are infinite.
3) The more conscious a reader is of her mental processes as she reads, the more she will facilitate them.

Data Sources

Overview of the Study

Six student readers were selected from four advanced English classes in a predominantly white, middle class rural high school. Readers were selected based on texts they had composed for an assignment in their English class. All six participants were audiotaped reading two texts, both selected from the same assignment. Before beginning, each participant read a short passage on the 11th grade reading level as a control for reading fluency: all the participants were determined to be fluent. Each also received a short training session, which consisted of listening to a student from a pilot study thinking aloud as she

read, followed by a practice protocol using a student essay from a previous pilot study. Participants were encouraged repeatedly to think aloud as they read; if participants read more than a paragraph without stopping, they would be asked to stop and express their thoughts. After finishing, participants were asked for the main idea, supporting ideas, and details of the essay without looking back over the text. I served the dual role of teacher and researcher during the course of this study.

Because this study was part of a larger study, with a longitudinal component, there was on average about a two month separation between the readings, during which time students received further instruction on essay organization and sentence structure.

Source of texts for the study

Texts used for this study were student generated. In the first assignment students were asked to write a persuasive essay no less than 3 pages long on a topic of their choice. It was hoped that students would pick a topic with which they had sufficient background to support their ideas adequately. They were encouraged to begin with a short narrative, description, quote, or some other form of attention-getting introduction, followed by a thesis statement, a supporting body of information, and a conclusion. Students were required to turn in a rough draft, for which they received both oral and written teacher feedback, and a final draft.

For the second assignment, students were again asked to write a persuasive essay of no less than three pages. The purpose of this assignment was to introduce students to a more complex form

of structural organization, which I will refer to as an "expanding essay." In an expanding essay, the writer's opening sentences establish an initial connection with her audience that expands as the paper develops. With each unfolding sentence and paragraph, a new context is created, making possible the introduction of ideas that would not have been comprehensible without the scaffolding of the previous ones. This was outlined to students as an introduction, followed by a dialectic leading to a more inclusive generalization, and ending with a thesis statement. Examples of real world texts with this structure include Abraham Lincoln's "Gettysburg Address" and William Faulkner's Nobel Prize acceptance speech. Within the field of writing research, a text fitting this scheme was called a knowledge-transforming model of writing by Bereiter (1987, p. 171-172).

In order to better teach the textual structure to students, all students wrote on the JonBenet murder. To ensure they had sufficient background knowledge on the topic, several magazine articles on the murder and the questions it raised about children's beauty pageants and child abuse were assigned and discussed. Students began the second assignment with a narrative introduction describing the crime, followed by movement through a dialectic (comparison and contrast) leading to a more inclusive generalization and ending with a thesis statement. To facilitate their understanding of this structure, students began by answering these three questions:

1) What happened? (Answered in the form of a descriptive narrative).
2) Are children's beauty pageants abusive? (Written in the form of a comparison and contrast.)

3) What distinguishes healthy supportive parental behavior from unhealthy abusive behavior? (Creating an inclusive generalization that culminates with a thesis statement.)

After addressing each of these three questions separately, students wrote a second draft in order to integrate what they had already written. They received teacher feedback on their second draft before writing a third and final draft. Students were not required to argue any particular point of view, and although strongly encourage to follow the format above, they were permitted to deviate if an altered approach better suited the meaning of their paper.

Selection of Participants:

Student participants were chosen to be readers based on the amount of paragraph subordination in the texts they composed for the first assignment. Levels of paragraph subordination were designated high, mid-range, and low based on the following criteria.

1) High — All the supporting paragraphs support one main idea, and more than one of those supporting paragraphs are subordinate to other supporting paragraphs.

2) Mid — Almost all (no more than one) of the supporting paragraphs are equally subordinate to one main idea.

3) Low — Supporting paragraphs may or may not be related to each other, but they were either loosely or not connected to one central

point.

Rationale for classifying students by levels of subordination comes from Christensen (1967) and Langer (1986). The work of both demonstrated that writers develop towards increasing levels of subordination. Christensen examined the work of professional writers in print, giving examples of how expert writers were able to construct several "levels of generality" within even a single sentence. He also distinguished coordinating and subordinating sentences in a paragraph. Coordinating sentences are on a roughly equivalent of generality, while sentences that subordinate are on a higher or more inclusive level of generality than neighboring sentences.

Langer, whose schemata served as a model for this study, showed how the levels of subordination became increasingly complex from age 8 to age 14. At age eight, most young writers are capable no more than grouping a collection of descriptive statements loosely around a main idea. By age fourteen, the paragraphs of adolescent writers, now considerably more complex, include causal support, adversatives, and several levels of generality.

The students in the the present study, who are approximately two years older than the fourteen-year-olds in Langer's study, had already experienced several years of writing essays with multiple paragraphs at the time this study took place. Therefore, it seemed reasonable that individuals would differ in their level of paragraph subordination. Six students, two for each the three levels of paragraph subordination discussed above, were chosen for the study. Sample schemata, diagramed according to paragraph number and representing the high and mid levels of subordination,

are illustrated in Appendix A. I did not include the low level of subordination for space considerations and because by its very nature it is difficult to illustrate.

Rationale for selecting the texts:

Two texts were selected for the study, both of which were written by the same student (Amy), one in response to the first essay assignment and the other in response to the second (both described above). Both of these papers were classified on the mid-range of subordination as described above (although the second paper showed slightly more paragraph subordination, probably due to the nature of the assignment). Selecting two texts in the mid-range of subordination allowed for data from two readers with a higher level of sentence and paragraph subordination in their texts, two readers on the same level, and two readers below the level of the texts, thus allowing a wide continuum of interactions between readers and texts.

Results

Objectifying the Text through Generalization

The coding scheme used to classify the student comments is based on the observation that the two most insightful commenters in the study (Bob and Cecily) both paid close attention to their cognitive processes as they read. Bob seemed to read the essays at a distance from himself, as if he had access to the innermost thoughts of someone else reading the text. So from watching the effect of the text on this "other reader," he was able to make inferences about the author's intentions. Taking two perspectives on the text allowed Bob to generalize a third perspective, which

in turn could be used to generalize yet another and so on, ad infinitum. This processes matches up very well with the account of cognitive growth given earlier:

1) The reader interprets text from one perspective (firstness).
2) The reader is able to distinguish a second perspective (secondness).
3) The interaction between these two perspectives generates a third, which can also be used to generalize a fourth and so on.

By taking multiple perspectives on the text, Bob was able to discuss it in more objective terms, as if understood what the author's intentions were. As he said about his response to the JonBenet essay, "I, I wasn't like looking from all the way across the world just to see his perspective. I, I can kind of easily se it from both sides. I can get an objective grasp of the essay."

If Bob is right - and I think he is - then an objective reading of a text involves making generalizations about that text from a variety of perspectives. Because each perspective serves as a check on the other, it does seem likely that the reader who takes multiple perspectives on a text is more likely to possess a more accurate grasp of the author's intentions than the reader with a more limited view.

Rationale for Coding Individual Comments

Coded student comments on the texts appear in Tables 1a and 1b (see below). All the terms listed in Tables 1a and 1b are defined in Table 2 (see Appendix B). The definitions and coded

Table 1a. Comments Classified by Text Structure and Student

	High				Middle	
	Bob		Cecily		Steve	
	1st	2nd	1st	2nd	1st	2nd
Perspective						
Alternate						1
Contrast	3	5				1
Irony/Analogy		1		1		
Author's	3		1			1
Coherence						
Integration	3	3	2	1		
Continuity	2			5		
Transition		1	1	1		
Syntax/Diction				7		
Prediction	1		2	1		
Intro			1			2
Casual Anomaly				1		
Content						
Context	2	1		1		
Example	3	1	5		1	
Imagery	2					
Sum/Gen	2	4	2			8
Reader effect	1					
Response/Content			4	6	15	2
Association			2			

Table 1b Comments Classified by Text Structure and Student

	Middle				Low	
	Karen		Lorena		Alexandra	
	1st	2nd	1st	2nd	1st	2nd
Perspective						
Alternate						
Contrast	1					
Analogy						
Author's						
Coherence						
Integration				1		
Continuity						
Transition						
Prediction	1			1		
Introduction			1	1		
Causal Anomaly						
Content						
Context						
Example	1		2	2		
Imagery						
Sum/Gen						
Reader effect		3		2		
Response/Content	11	22	14	14	20	14
Association	7	2				

comments in the table are arranged according to a posited level of increasing generality. For instance, the least generalized form of comment was an association. An association was merely a reader's free association in response to the segment of text they just read. A typical comment in this category might begin as "Ok, this is making me think of . . . " or " I was thinking of . . . this reminds me of . . ." An Association comment was never elaborated on or related to any part of the text after the first reaction.

The next level of response is called "Response to Content." A Response to Content comment typically began, "I think I would disagree . . . " or "Which is true." A Response to Content comment is categorized at a level higher of generalization than an Association because of the evaluative part of the response requires an extra cognitive step. Whereas a pure association could be likened to a "knee-jerk" response to the text, when a reader made a Response to Content comment, she had to compare her real world knowledge (perhaps an association) to the information she received from the text (the situation model) and make a truth value judgment about the text.

Likewise a Summary/Generalization statement was another step up the ladder. A summary generalization statement typically began "Here the author is trying to show . . . " or Here, it's saying . . . " A summary /generalization comment was another higher level of generalization because, unlike the dualistic positive/negative response to the truth value of the text, the reader tried to objectify the text, a necessary step to using it as part of a situation model in which generalized segments of the text, interact with each other to create new meanings very far removed

from the surface code.

In this way, the coded comments in the table continue in their progression from the lowest level of generality to highest.

Rationale for Organizing Sections of Coded Comments

Like the individual terms, the sections labeled Content, Coherence, and Perspective are arranged in an ascending hierarchy from the bottom to the top of the page, The comments coded within each section are a reflection of what part of the text the student is using to construct meaning. Comments in the 1) Content section are local responses to meaning, 2) Coherence section are global responses, and 3) the Perspective section fall in an intermediate level, a range broader than just the last few lines of text, yet one that does not encompass meaning across the entire text.

For instance, within the Coherence section, all of the comments deal, in some way, with meaning across the text. Even the lowest level of comment, casual anomaly, which is nothing more than the reader's feeling that the text is not unfolding in a logical manner, suggests the reader has an implicit grasp of the author's global intentions. On the other hand, the reader's ability to comment explicitly on a higher level category like continuity - which is the author's ability to link the broader, more generalized ideas in the text (situation model) - implies a deeper understanding of the author's global intentions and with it a firmer grasp of the details of the text and correspondingly broader generalizations.

The Perspective section of the Tables 1a and 1b include comments on different points of view. At the lowest level, it is simply an inference about the author (such as the author's gender)

or a change in the author's point of view. As the number of points of view increase, so does the level of generality. Each is a subsidiary view within a more comprehensive view. At the highest level of generalization within the Perspective section are comments which identify a third perspective, one that is not part of either end of a dualistic perspective, but offers an alternate perspective.

As a rationale for making Perspective the highest level of generality, I would offer the following two points: 1) In Judith Langer's study, both eight- and fourteen-year-olds were able to build their paragraphs around a single main point. The difference between the younger and older writers was that fourteen-year-olds created a far more complex intrastructure, an observation which leads me to my second point. 2) If, as I pointed out earlier, greater differentiation leads to greater generalization, then the increasing complexity of the intra-text structures would seem to be a strong indication of a higher level of development. Therefore, the more developed thinker is not only able to do a better job of discriminating smaller parts but will also be distinguished by her flexibility and proficiency to interpret and reinterpret parts and sub-wholes of a whole. Arheim has claimed this skill for artists (Cupchick and Winston, 1996), and cognitive research on reading has demonstrated that expert readers generate far more interpretations as they read than their less proficient counterparts (Gagne, E.D., Yekovich, C.W., and Yekovich, F.R. 1993).

The reasoning just given also gives an insight for the hierarchal arrangement of categories in the Perspective section. The reader's ability to distinguish alternative perspectives in a

text - other than the main point - suggests an ability to distinguish a sub-whole in the text. From this, it follows that the more perspectives the reader can distinguish, the greater her ability to differentiate meaning within the situational model and consequently the greater her ability to generalize between those views.

Analysis of Individual Student Comments

As the tables clearly show a preponderance of the protocol comments were made on the Content level, with fewer made on the Coherence level and fewer still on the Perspective level. Students selected for a low level of textual complexity (Lorena and Alexandra) commented for the most part on the content level with a few exceptions. Alexandra, whose first essay was little more than a narrative of a trip to Mexico, commented exclusively on short segments of text; every one of her comments was coded as a response to text.

Students selected for the complexity of their texts (Bob and Cecily) had a far greater range of comments, although they, too, had proportionately more comments on the Content level, fewer on the Coherence level, and still fewer on the Perspective level. Of interest is the different style of reading Cecily and Bob gave the texts. Cecily commented on them almost as if she were an English teacher, pointing out errors in the surface code, like diction and syntax, as well as errors within the situation model, like continuity. In contrast, Bob rarely commented on the surface code, only relationships existing within the situational model, and he never said anything negative about the papers - a conscious choice and personal policy. He said if he found something lacking

about the paper, he preferred to skip over it.

The two students chosen because their texts represented a middle range of complexity were the hardest to draw conclusions about. Karen's comments were confined almost exclusively to the Content level of the coding system, and she actually had fewer high level comments than Lorena, whose original paper lacked coherence. This may suggest that either it will prove difficult to distinguish levels of textual development very accurately or that a finer analysis than paragraph subordination will be needed to distinguish those levels.

Steve's comments are also of considerable interest. Of all the participants, he made the most marked improvement from the first to second reading. The difference between his performances elicits the following questions:

1) Did thinking aloud while reading have an effect on his thinking processes - either due to a practice effect or perhaps because they increased his awareness of his thinking processes?
2) Did writing an essay utilizing a more complex form of textual organization have an impact on his thinking processes?
3) Was Steve cognitively positioned in such a way before the study began that would make him most able to benefit from the teaching and research methods used in the study? In other words, was he better located in the zone of proximal development to benefit from this study?

In summary, two students with the most complex text constructions clearly differed from the rest of the participants

in the nature of their comments, which does suggest a correspondence between student text structures and thinking processes. It was difficult, however, to distinguish the middle and low range of textual complexity, except for Steve, who made considerably more comments than the other three on the second assignment. This result may mean Steve either made significant cognitive gains during the study, that he had a particularly good reading of that particular text on that particular day, or that Karen was originally misclassified as a middle range student. This last point suggests a finer grained analysis is needed to better sort out students according to the level of complexity in their textual structure.

Implications

I have not meant to suggest that there is a one to one correspondence between the students' think aloud comments and their thinking processes. But of the six fluent readers in this study, the two who created the most complex levels of text clearly possessed the highest awareness of text structures.

Establishing a link between thinking processes and textual structures has considerable significance for the teaching of both reading and writing. By knowing what kinds of thinking processes are associated with more complex text structures, teachers could address them directly in their instruction and in so doing benefit students' thinking when either reading or writing.

List of References

Beach, R. (1993). A teacher's introduction to reader-response theories. Urbana, IL: National Council of Teachers of English.

Belenky, M., Clinchy, B., Goldberger, N., & Tarule, J. (1986)Women's Ways of Knowing: the development of self, voice, and mind.
New York: Basic

Bereiter, C., & Scardamalia, M. (1987). The psychology of written composition. Hillsdale, NJ: Lawrence Erlbaum Associates.

Christensen, F. (1967). Notes toward a new rhetoric: six essays for teachers. New York: Harper and Row Publishers.

Deely, J. (1990). Basics of semiotics. Bloomington, In: Indiana University Press.

Eco, U. (1976). A theory of semiotics. Bloomington, IN: Indiana University Press.

Flavell, J.H. (1963). The developmental psychology of Jean Piaget. Princeton, NJ: D. Van Nostrand Company, Inc.

Gagne, E.D., Yekovich, C.W., and Yekovich, F.R. (1993). The cognitive psychology of school learning. (2nd ed.). New York: Harper Collins College Publishers.

Gibson, E.J. (1992). How to think about perceptual learning: twenty-five years later. In H.L. Pick, Jr., P. Van Den Broek, and D.C. Knill (eds.). Cognition: conceptual and methodological issues. Washington, DC: American Psychological Association.

Gibson, E.J. (1984). Perceptual development from the ecological approach. In Michael E. Lamb, Ann L. Brown, and Barbara Rogoff (Eds.), Advances in developmental psychology, Vol 3. Hilldsdale, NJ: Lawrence Erlbaum Associates.

Gibson, E.J. (1969). Principles of perceptual learning and development. New York: Meredith Corporation.

Gibson, J J. (1979) The ecological approach to vision. Boston, MA: Houghton Mifflin Company.

Gibson, J. J. (1977). A theory of affordances. In Robert Shaw and John Bransford (Eds.), Perceiving, acting, and knowing. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gibson, J. J. (1966). The senses considered as perceptual

systems. Boston, MA: Houghton Mifflin Company.

Gilligan, C. (1978). In a different voice: women's conception of the self and morality, Harvard Educational Review, 7(4), 481-517.

Gilligan, C. (1982). In a different voice: psychological theory and women's development. Cambridge, MA: Harvard University Press.

Graesser, A.C., Millis, K.K. and Zwann, R.A. (1997). Discourse comprehension. Annual Review of Psychology, 48:163-89.

Heath, S.B. (1982). What no bedtime story means: narrative skills at home and school. Lang. Soc. II, 49-76.

Henning, J. (1998, April). Constructivism: the art of cultivating thirdness. Paper presented at the annual meeting of American Educational Research Association.

Hooper, J. (1991). Introduction. Peirce on signs: writings on semiotic by Charles Sanders Peirce. (James Hoopes, Ed.), Chapel Hill, NC: The University of North Carolina Press.

Langer, J.A. (1986). Children reading and writing:structures and strategies. Norwood, NJ: Ablex Publishing Corporation.

Long, D.L. and Bourg, T. (1996). Thinking aloud: telling a story about a story. Discourse Processes, 21, 329-339.

Lorch, R.F., Jr., and van der Brock, P. (1997). Understanding reading comprehension: current and future contributions of cognitive science. Contemporary Educational Psychology, 22, 213-246.

Merrell, F. (1995). Peirce's semiotics now: a primer. Toronto, On: Canadian Scholars' Press.

Peirce, C S. (1991). Peirce on signs: writings on semiotic by Charles Sanders Peirce. (James Hoopes, Ed.) Chapel Hill, NC: The University of North Carolina Press.

Peirce, C.S. (1965). Collected papers of Charles Sanders Peirce (Vol. 1). (Charles Hartshorne and Paul Weiss, Eds.) Cambridge, MA: Harvard University Press.

Piaget, J. (1985, 1975). The equilibration of cognitive structures: the central problem of intellectual development. (Terrance Brown and Kishore Julian Thampy, Trans.) Chicago: The University of Chicago Press.

Piaget, J. (1970a). Genetic epistemology. (Eleanor Duckworth,

Trans.) New York: Columbia University Press.

Piaget, J.(1970b). Structuralism. (Chaninah Maschler, Trans.) New York: Basic Books, Inc. (Original work published 1968.)

Reed, E.S. (1988). James J. Gibson and the psychology of perception. New Haven, Ct: Yale University Press.

Scholes, R. (1989). Textual power: Literary theory and the teaching of English. New Haven, CT: Yale University Press.

Vygotsky, L.S. (1986). Thought and Language. (Alex Kozulin, Trans.). Cambridge, MA: M.I.T. Press. (Original work published in 1934 as Myshienie i rech).

Vygotsky, L.S. (1978). Mind in society: the development of higher psychological processes. (Michael Cole, Vera John-Steiner, Slyvia Scribner, and Ellen Souberman, Trans.) Cambridge, MA: Harvard University Press.

Whitney, P. and Budd, D. (1996). Think-Aloud protocols and the study of comprehension. Discourse Processes, 21, 341-351.